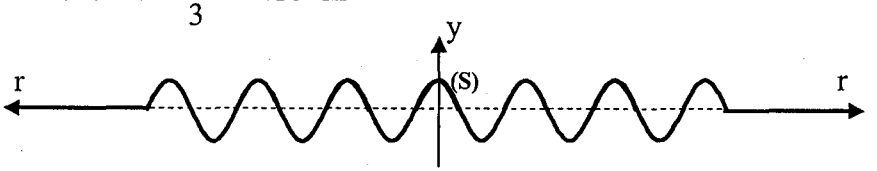
EXERCICE 8 :

1)

a) $d = 3\lambda \Leftrightarrow \lambda = \frac{d}{3} = 4.10^{-3}$m

b)



c) $t_1 - t_0 = \frac{r_F - r_S}{C} \Leftrightarrow t_1 = \frac{3{,}25\lambda}{C} = 0{,}026$ s. Or $r_F = 3{,}25\frac{C}{N} \Leftrightarrow$

$N = \frac{3{,}25C}{r_F} = 125$ Hz.

d) $y_S(t_1) = a \Leftrightarrow \text{Sin}\,(\frac{2\pi}{T}3{,}25T + \varphi_S) = 1 \Leftrightarrow \frac{\pi}{2} + \varphi_S = \frac{\pi}{2} \Leftrightarrow \varphi_S = 0$ rad.

$y_S(t) = a\,\text{Sin}\,(250\pi t)\ \forall\ t \geq 0s$ (y_S en mètre et t en seconde).

2) $y_A(t) = a\,\text{Sin}\,(\frac{2\pi}{T}t - \frac{2\pi\, r_A}{\lambda})$ et $V_A(t) = \frac{2\pi}{T}a\,\text{Sin}\,(\frac{2\pi}{T}t - \frac{2\pi\, r_A}{\lambda} + \frac{\pi}{2})$.

$t_2 = 4{,}25T$ et $r_A = 3{,}25\,\lambda$ donc $V_A(t_2) = \omega a\,\text{Sin}\,(\frac{2\pi}{T}4{,}25T - \frac{2\pi\ 3{,}25\lambda}{\lambda} + \frac{\pi}{2})$

$V_A(t_2) = a\omega$ d'où $V_M(t_2) = \omega a\,\text{Sin}\,(\frac{2\pi}{T}4{,}25T - \frac{2\pi\, r}{\lambda} + \frac{\pi}{2}) = a\omega \Rightarrow$

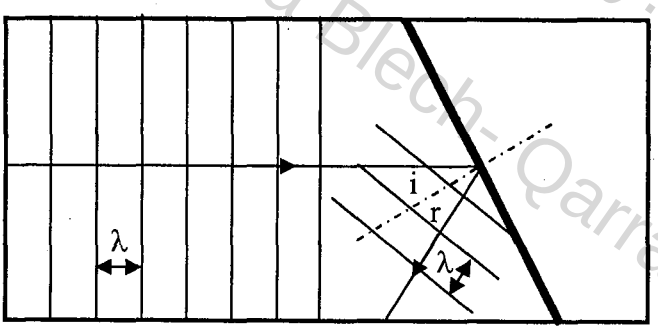
$\text{Sin}\,(\frac{2\pi\, r}{\lambda}) = 1 \Rightarrow \frac{2\pi\, r}{\lambda} = \frac{\pi}{2} + 2k\pi \Rightarrow r = (4k+1)\frac{\lambda}{4}$. $0 \leq r \leq 4{,}25\lambda \Rightarrow$

$-0{,}25 < r \leq 4 \Rightarrow$ $k \in \{0,1,2,3,4\} \Rightarrow$ les points sont situés sur des cercles de rayons $\{\frac{\lambda}{4}; \frac{5\lambda}{4}; \frac{9\lambda}{4}; \frac{13\lambda}{4}; \frac{17\lambda}{4}\}$.

3)

a) En rencontrant l'obstacle, l'onde subit un changement de direction mais toujours dans le même milieu $\Rightarrow$ c'est la réflexion.

b)



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